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ABSTRACT

The study explored preparation of 38 instructors of motor skills for the handicapped through a competency-based mastery learning format. Both mastery learning and non-mastery learning formats of instruction were used to train the potential teachers. A systems approach to training was employed in a performance-based practical competency-based format. The mastery learning format involved instructional inputs with protocols which related to practical events, student responses to materials to generalize instructional information, in-class drill with feedback to selected students. Out of class activity, on a volunteer basis, provided additional instruction, drill on concepts, peer evaluations for competency, and peer drill of content. The results indicated that the mastery learning activity produced higher achievement than non-mastery activity. More time was spent by the students per time value of credit awarded in mastery learning activity. Furthermore, there was a significant relationship between the time spent in preparation for the mastery learning component of the course and performance on the examination. Author/CL)

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TRAINING TEACHERS OF THE HANDICAPPED THROUGH A COMPETENCY BASED FORMAT TO INSTRUCT MOTOR SKILLS

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There is a growing consensus among researchers who have studied the effects of training personnel that a systems approach may maximize behavioral outcomes of learners (Montemerlo and Tennyson, 1976). Training is defined as the acquisition of skills or concepts that may result in improved performance of personnel who undergo training. A system, on the other hand, infers emphasis on objectives, precisely controlled learning experiences, consistency among test and items and instruction, instructional objectives and also application about what is known of effective instructional practices (Montague, 1978 and Wulfeck, et. al., 1978). Furthermore, implicit in a systems approach is an appropriately designed environment which includes the role of the instructor in preparation of materials and communications aids (Randall, 1978). However, the ultimate test of effective systems is the ability of the user to translate information into instructional objectives and relevant criterion which learners must master. The criterion development of behavior attained by personnel through training reflects the dynamic nature of the training process.

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Types of Knowledge

A training system infers that there be consideration of the nature of the knowledge which is prerequisite to attainment of training objective. Contemporary researchers have distinguished between procedural and declarative knowledge (Anderson, 1970). Procedural knowledge refers to what a person knows that will enable skilled performance. For instance, teacher behavior for those who conduct instruction according to applied behavioral analysis must perform against a criterion that has been established from research and demonstration. This type of behavior is governed by principles that constitutes procedural knowledge (Vinegrad, 1984). On the other hand, declarative learning refers to the facts that have been learned or retained. Thus, in training personnel, decisions must be made as to the type of knowledge that is to be acquired by the learner and the necessary learning experiences that will enhance the generalization of a specific type of knowledge to an applied setting. The incorporation of training strategies with respect to the nature and use of the type of knowledge is another relevant dimension of systems training. It would appear that procedural knowledge would require a more sophisticated training system. Clearly, the nature of the training content may be related to the sophistication of the training system.

Functional Assessment and Programming

Functional assessment and programming provides an integrated approach for meeting the unique needs of persons who are attempting to learn skills or increase performance on specific skills. Such a procedure identifies goals to be achieved by the learner, assesses the extent to which the goals are achieved, identifies the prerequisites or general abilities related to the skills that can be improved through training, selects appropriate strategies and activities commensurate with ability of the learner, and continuously monitors the progress of the individual towards the goals. Central to the process of functional assessment and programming is the interaction of taxonomies which make it possible to identify and train these abilities in such a manner that they transfer to assist skill acquisition (White, 1973). For example, in rehabilitation settings, the benefits of improved strength is to acquire functional movement. In utilizing the instructional technology of functional assessment and programming, it is vital that the taxonomies of abilities which are to be interrelated are clearly understood by those who will use them. The conceptual framework of ability structures provides the functional assessment instrument against which strengths and weaknesses of prerequisites for success in a specific motor task may be measured. The instructional behaviors required to practice functional assessment and programming are interrelated and must be acquired by instructors-in-training (students) at criterion levels of mastery so interrelationships can be

formed to utilize this emerging instructional technology. Thus, sophisticated training systems must be employed to achieve interrelated complex training objectives.

Mastery Learning

Mastery learning formats have practical application to systematic training. More favorable learning conditions may be provided through the implementation of mastery learning. A variety of mastery learning formats have been introduced to the field through experimentation (Block, 1974 and 1976). A key element in mastery learning processes is the use of feedback and corrective activities with each instructional unit. Under mastery learning, students are provided with regular checks on their training progress. These checks are then paired with specific corrective activities that are designed to assess students and remedy any learning difficulties that are being experienced. Mastery learning theorists suggest that 80% of the students may reach the same high level of attainment in which only 20% of the students would reach under more traditional approaches (Bloom, 1976).

Concerns of adverse consequences of mastery learning formats have been raised by Grabe, 1984. Recent advances in self worth theory (Covington, 1981) have brought new perspectives of the impact of mastery learning on low achievers.

Covington and Omelich, 1979, point to the likelihood

that poor performing students may see themselves as incompetent. Thus, there may be subversion of efforts to master content by reduction of effort to protect feelings of self worth.

In the majority of the mastery learning studies, the focus is on outcome variables. The behavioral treatment variables through which changes are produced have tended to be ignored. However, there is an emerging set of techniques, demonstrations, and models that introduce independent treatment variables that provide for learner success as they move towards mastery. There should be strong consideration in the design of training programs to include techniques and methods that assure continued success of individual trainees. This may assist in countering such adverse effects on self worth. Therefore, there may be a need to design training programs to maximize pupil success as they progress through systematic training to achieve terminal objectives and goals.

Teacher and Course Characteristics

The teacher and course characteristics of a training system play a significant role in the acquisition of training outcomes by students. A modfied list of variables suggested by Vinegrad (1984) are as follows:

1. The nature of the training modules.
2. The adaptive structures of the training systems which provide student monitoring.

3. The nature of response materials.
4. The nature of the drill and practice sessions.
5. The nature and the design of simulations which facilitate acquisition of the training objectives.
6. Instructional techniques that provide models of exemplary behavior in which students can observe what they are to do (Hayes and Roth, 1977).

Another important characteristic of the organizational environment, is the appropriate use of contingencies to develop appropriate behavior through the training system. Incentives enable students to work continuously in efforts to attain mastery of training objectives. Thus, there are several organizational variables that need to be studied which may impact on the effectiveness of systematic training program.

Therefore, the purpose of this study was to explore variables of student performance in the acquisition of for functional assessment and programming skills through a systematic modified mastery learning format.

PROCEDURES

Subjects

The subjects for this study were 38 upper-class students at Slippery Rock University majoring in physical education. These students participated in a required

class designed to train teachers with skills to apply functional assessment and programming which enable handicapped children to participate in individualized instruction in classes with the non-handicapped.

Curricula Content

The teaching of motor skills requires that instructors know what to teach and how to teach it. A small sample of these two essential aspects for teaching motor skills were a part of the mastery learning content. This content involved perceptual motor taxonomies of (Auxter and Pyfer, 1985) and a physical motor taxonomy of (Fleischman, 1965).

Functional assessment and programming (FAP) requires detailed study of behaviors so that the skill prerequisites may be identified for programming to increase skill acquisition and proficiency. Thus, it is imperative that the taxonomies be memorized and used to classify observable behavior.

Practical Portion of the Written Non-Mastery Learning Test

The fifteen hour training experience was extended over 6 weeks. This was a segment of a 15 week course. The instruction was designed to familiarize students with functional assessment and programming needed to comply with federal laws of the United States to meet the individual needs of handicapped individuals through individualized programs of motor activity. Two types of examinations were

constructed. One was of a practical nature where the student was to engage in active behavioral performance and was to meet mastery at a 100% criterion level. The other was a cognitive written examination which was scored in a traditional manner (one point off for each incorrect answer). One fourth of the final written test also tested content covered in the practical examination. Therefore, the portion of insturction of the practical examination was measured in two ways. Once by a written non-mastery test and again, by a mastery learning format which required physical demonstration in simulation. This was to assist the generalization of cognitive information so it was more apt to be applied in natural settings.

Description of the Mastery Learning Format

There were several instructional experiences which were part of the four (FAP) Mastery Learning Units. However, there were a greater number of units that were tested with written non-performance, non-mastery tests. The mastery learning format that was employed in this study was modified from those described by Bloom (1976) and Block (1974) which controlled the variable of time as pupils moved toward mastery of instructional units. Inasmuch as the administration of the instructional program did not allow for the manipulation of the time variable, subjects had mastery designated at specific time frames within the administrative structure of the university. However,

out-of-class training was provided to the subjects so progress could be made toward mastery of the units at their own rate. In this study, a body of information was accumulated by the subjects over a six week period and opportunity for practice was provided through out-of-class training sessions. Student performance was examined on the four instructional units for mastery at the end of 6 weeks. If the instructional unit was mastered, a specified value was awarded to the subject for the final grade. Otherwise, the subject lost all credit on the unit. Thus, there was strong incentive to master each instructional unit of the practical mastery examination.

The mastery learning format differed significantly from the non-mastery written tests in another way. Many subjects achieved mastery on peer evaluations during practice training sessions. However, they were required to retain all of the information through maintenance sessions until the final practical examination. Thus, for those students who participated in out-of-class training there may have been considerable over learning of the content to be examined.

The consequences of performance on the practical examinations and the written non-mastery examinations were different. The practical examination required one hundred percent mastery on each of four separate instructional units. However, the written non-mastery test was graded

according to the number of correct answers. Thus, the incentives were different for the practical as compared to the written examination. The practical mastery examination required more intense study to completely master a unit than the written non-mastery test. However, the written test was weighted five times greater than the practical mastery examination.

Description of the Test Battery

The units of mastery learning were to train subjects to utilize perceptual motor and physical motor taxonomies and train their pupils to self instruct and evaluate themselves to conduct programmed instruction. Behavioral principles from research and demonstration were to be utilized in this training process. Three units of modified mastery learning involved generalization of concepts from the taxonomies into active motor performance.

The criterion level for mastery on these units required demonstration of two behaviors from a sample of seven physical and motor abilities and seven perceptual motor abilities from the respective taxonomies. Test items were selected by the examiner not the subject. The active behavior of the subject being tested was evaluated to determine if the concepts of the taxonomies could be generalized into performance. A third unit involved active performance by subjects on a test item and a measure of a sample of seven physical and motor abilities and a

description of the test measure. The fourth unit of the modified mastery learning format involved subject demonstrations of teaching a program according to behavioral principles. Eight principles from applied behavioral analysis were incorporated into the demonstration of a four-frame programmed instruction teaching module. In all, 20 errors could be made in this simulated teaching situation. No pedagogical errors during instruction could be made if the student was to receive credit (1% of the total grade).

The knowledge of the taxonomies required that subjects generalize concepts into active motor behavior. The concepts in the physical and motor taxonomy were extent flexibility, dynamic flexibility, static strength, trunk strength, exploxive strength, gross body coordination, gross body equilibrium, stamina, and speed of limb movement. The concepts in the perceptual motor taxonomy are reflexes, general, special and ocular motor systems and various traits subsumed under body image,and spatial relations. (Auxter and Pyfer, 1985).

One instructional unit was tested under simulated conditions, This was to enable the subjects to teach their pupils to self-instruct and evaluate their own learning. Eight specific psychological principles were to be learned by the subjects for the purpose of teaching self-directed learning. These principles from research and demonstration were as follows:

1. Maximize sensory inputs by providing visual/verbal models of new teaching material.
2. Control latency by providing a quick "do it" signal to expedite the movement of the learner on the task.
3. Control information overload by limiting the number of concepts to be taught at one time.
4. Present overlearning by review of the difficult to learn material in each frame.
5. Engage the learner in active responding.
6. Provide accurate feedback to each response so correction of the response could be made.
7. Continuously monitor the progress enroute to learning all of the cognitive knowledge relevant to acquisition of the target behavior (self-directed learning in a simulated program).
8. Evaluate the acquisition of the terminal behavior.

The simulated behaviors for the first frame of of the teaching program was as follows:

1. Stand on a chair 18" in height.
2. Place the stick between the middle fingers. (18" stick measured in 1/4 inches.)
3. Bend forward from the waist.

The second frame involved adding the concepts of keeping the knees straight and holding the stick down for 1 second avoid a ballistic stretch. (Stick between the middle finger was reviewed.)

The third frame involved teaching to measure from the 1" end of the stick down to the 18" end and to score themselves.

The final frame was to test the previously learned seven concepts.

Scoring of the practical

There were four distinct components of the examination They were as follows.

1. Active demonstration of two activities of each of the physical and motor abilities.
2. Active demonstration of a test item and provision of an explanation of measurement for a sample of 7 physical and motor fitness abilities.
3. Active Demonstration of two examples of seven selected perceptual motor abilities.
4. Teach four frames of a lumbar flexibility program that is in accord with psychology principles from research and demonstration.

All of the four test items required perfect performance before credit was awarded. The total percent of the final grade for mastery of all four of the examination units was 5% of the total grade for the course.

Instruction

The basic instruction of the study involved fifteen

hours of training. This instruction was provided to all students. However, there was considerable out of class instruction that was at the discretion of the learner. In addition, there was outside study and practice by each learner depending upon how much time a specific student desired to study or practice. Instruction was presented utilizing a modified version of the Gagne and Dick (1983) model which incorporated principles from information processing theory and applied behavioral sciences. Input materials were provided with visual transparencies displayed on an overhead which were accompanied with verbal descriptions and overt physical and motor behaviors, in an applied form. After presentation of instructional inputs, each learner was required to write an exercise in a workbook which was designed to generalize the concepts taught. Feedback was provided in class through peers exchanging comments on each other's work. These exercises were followed by mass drill accompanied with instructor feedback to selected students. No competency evaluations were conducted during scheduled class instruction.

Attempts to assure Success Experiences

It is important that success on mastery learning experience be provided for the subjects. There should be at least partial success at each step of the training system that leads to mastery learning. Three considerations were

taken into account to assure a reasonable degree of success for the subjects. They were:

1. Cooperative solutions to problems with peers.
2. Prompting students into the correct responses.
3. Testing on only one part of a complex unit at one time.

Below is a list of provisions to assure at least partial success on each experience in the training system.

Workbook experiences - Peers provided feedback which verified the appropriatness of the answers.

Out of class instruction - Feedback was provided by the instructor during drill. Modeling, and prompting of appropriate responses were provided to assure success.

Pre-evaluation of the practical mastery examination - Options of taking or postponing the practical examination were provided.

In class short quizzes - Opportunity was provided to generalize conceptual information to units which were tested from the practical mastery examinations.

MODIFIED MASTERY LEARNING FORMAT

There were a variety of components built into the training system so students could learn mastery learning units. Some of the instructional components varied from traditional cognitive mastery learning formats. An essential difference from several of the mastery

learning formats was application of conceptual knowledge, through motor performance. Other differences follow:

1. Abstract concepts were paired with examples of observable motor performance.
2. Generalization of concepts were attempted through written expression in an academic exercise.
3. Conceptual information was generalized through active performance (i.e. show me three examples of extent flexibility).
4. Drill by peers was provided in a structured situation.
5. Drill was provided by a trained person who had underwent training in out-of-class instruction for those who were not exposed to those opportunities.
6. Self-study was also another type of out-of-class preparation for examinations.

Study procedures for the written examination took traditional formats where individuals studied by themselves or in groups.

Out of Class Instruction

Out-of-class instruction was held four times during the 6 week time frame. Training for each out-of-class instructional session required that students respond to information that had accumulated throughout the course. In the out-of-class instruction, a review of the first unit was the content of the first session. A review of the first and second units was the content that was practiced

during second out-of-class session, etc. until all four of the practical instructional units were reviewed and practiced. The final practice session was a simulation of the practical examination. All out-of-class instruction was voluntary.

The techniques employed in the out-of-class practice sessions were as follows:

1. Instruction to the subjects reviewed the content of the unit.
2. Mass drill was presented by the instructor with feedback to selected persons.
3. Peers drilled one another and provided feedback.
4. Students were trained to administer mastery examinations of specific components of each unit at the end of an out of class instructional session.

Pre-Practical Mastery Examination

A pre-practical mastery examination was held the evening before the final practical examination. One unit was selected to expose students who wished to experience the environment of the practical examination. In this examination session, three observers studied the behaviors of a subject who presented two activities for each of seven physical and motor ability prerequisites of a taxonomy selected by the examiner. If the subjects could not demonstrate two activities of each of the seven selected physical and motor ability prerequisites, or provide a

demonstration that fit the conceptual definitions of the ability prerequisites, they did not receive credit for that unit and could not make up the examination. The students had the perrogative of taking the pre practical mastery examination at any point in time up to entering the room where this evaluation was to take place.

Individual Study

Some subjects engaged in individual independent study. This usually involved memorization of information and was nonactive in nature. Individual study was utilized in preparation for the pre-practical examination, practical examination and the final written non-mastery test. Independent study occurs when an individual feels the need to memorize and hold information for examination purposes. However, once cognitive recall has been made which links conceptual information to generalization of activity (matching an activity to a concept) it must still be expressed in an observable relevant overt behavior. The last step of this learning process is usually circumvented when examples of concepts are memorized without overt application of an active behavior to a concept.

Final Practical Examination

In the final practical examination, each subject was evaluated individually by two evaluators simultaneously. There were four examination areas in the test environment.

(i.e., physical and motor abilities and the test items and measures, perceptual motor abilities and the application of behavioral principles to teaching self directed learning.) Directions for taking the tests and the consequences of success and failure were presented by the trained examiners.

Differences of the Consequences for each Experience

To maximize the acquisition of training skills, it is desirable to develop contingencies to motivate performance of students. Each experience in the mastery learning instructional format had different contingencies placed upon the attempts of students to successfully complete instructional experiences. The most powerful contingency was placed on mastery of the four units during the final practical evaluation. Failure on any one of the parts of a mastery experience resulted in no credit for that particular experience. The lowest and perhaps the least aversive consequences within the mastery learning system were peer evaluations in out-of-class instructional sessions, where information was shared with a partner to enable mutual feedback. This format was also used to solve specific written exercise in a workbook during formal instruction. The positive and aversive contingencies associated with each of the experiences of the master learning format are listed below.

Listening to instructional inputs - difficulty in filling in work book experiences in class (aversive)

Workbook response materials - difficulty in communicating information develop in the workbook for a peer. (aversive)

Out of class instructional drill -1. opportunity to pick up extra credit for attending, 2. support to understand class instruction, and 3. preparation for the final practical examination. (all positive)

Pre-Final Evaluation - Loss of three points on the final grade for lack of mastery (aversive)

Self Study Before the Practical Examination - Potential failure on the final practical examination. (aversive)

Written Examination - potential loss of 25% of the grade five times that of final practical examination.

Final Practical Examination - potential loss of up to 4% of the total grade. An additional 3 points could be lost if mastery was not met on the pre-final evaluation practical.

The written examination provided an opportunity for greater contribution to the grade 25% of the total than did the final or practical examination which was only 5% of the course grade. The maximum amount of credit that could be acquired by attending extra sessions was less than .5% of the total grade.

Simulation

When the objective of training is performance, simulations are effective and a desirable techniques to

evaluate concepts learned by the students. One of the units required that teaching techniques be practiced under simulated conditions. The practical examination unit for teaching self-directed activity through programmed instruction took the form of simulation.

Measurement of Student Effort

The nature of the effort put forth by subjects for preparation of the practical and written examinations were different. The out of class activity for the practical examinations were more frequent than preparation for the non-mastery written tests. Furthermore, the out of class instructor training sessions episodes in all were benchmarks that directed study toward the practical mastery examination. On the other hand, the written non-mastery examination required three study episodes for the students. They were for two short quizzes and the final written examination. The time of out-of-class activity for preparation of the examinations was measured though individual face-to-face interviews with each subject as to how much time was spent in out of class preparation for each segment of the instructional system. The out of class activity conducted by the instructor was documented and was hard data. The subjects recollections of study time was "soft" data.

RESULTS

Failure on the Modified Mastery Learning Examination

Failure on mastery learning units was minimal. Seventy-eight percent of the persons who took the mastery learning practical examination mastered all of the four instructional units at 100% mastery level. Furthermore, 92% of the instructional units were mastered by the subjects.

One of the purposes of the study was to determine differences, if any, between student performance, on a modified mastery practical performance examination and a non-mastery written examination. The .05 was set as the level of significance to determine significant differences between the types of tests. Table 1 indicates that through the one way analysis of variance there was a significant difference (F=2.69; Prob=.02) in favor of student performance on the practical mastery learning examination when compared to the written non-mastery test.

ANALYSIS OF VARIANCE

A COMPARISON OF SCORES ON THE WRITTEN NON-MASTERY AND PRACTICAL PERFORMANCE EXAMINATIONS

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
Between Groups	19	10523.0570	553.8451	2.6872	.0205
Within Groups	18	3709.9167	206.1065		
Total	37	14232.9737			

Another purposes of this study was to determine differences, if any, in study procedures of the subjects in

preparation for performance practical mastery examinations and written nonmastery examinations. In this study, the weighted value of the written non-mastery evaluation was five times that of the practical examination. Table no. 2 displays a one way analysis of variance which indicates that there is no significant differences (F = 1.35; F Prob.= .26) between the amount of time that students spent in preparation for the performance mastery examination and the written non-mastery examination.

Table No. 2

ANALYSIS OF VARIANCE

A COMPARISON OF THE AMOUNT OF TIME SPENT IN PREPARATION FOR THE PRACTICAL MASTERY EXAMINATION AND THE WRITTEN NON-MASTERY TEST.

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
Between Groups	6	27.6046	4.6008	1.3524	.2645
Within Groups	31	105.4568	3.4018		
Total	37	133.0614			

Regression Analysis

Regression analysis was applied to determine variables that might predict performance on both the practical mastery examination and the written non-mastery examinations. The analysis of data reveals that time spent on preparation for the practical mastery learning examination was the only

variables that could predict success on examination scores. (T = 2.59 significant at the .014 level.)

Correlation Among Variables

Correlations were calculated on the variables of the study. The .05 level was set as significance for relationships among variables. The data revealed that there was a significant realtionships between scores on the practical examination and written (.34; P = .019).

There was also significant relationships between time spent on the practical and the score on the written non-mastery practical portion. (.31 T = .32)

DISCUSSION

More Time Spent on Mastery Learning

There was no significant difference on the time that subjects spent on out of class activity for the mastery learning units when compared to the final written non-mastery examination even though weighted value of the written test was more than five times the value of the practical performance examination. If the grades which were to be placed on a permanent record was a motivating factor for participation in an educational experiences, there would be greater time spent on the final written examination. However, this was not the case. There are several plausible explanations for the desparity of time spent per weighted

value for grade credit. Some are the magnitude of the consequence for failure, the immediacy of the consequence, the nature of the consequence.

First, the novel conditions of the consequence, of no credit for failure on a single part of the mastery practical examination may have provided motivation for intense study for a relatively minor protion of the instructional content. Second the immediacy of the feedback is either more reinforcing or punishing depending upon whether the individual has failed or succeeded on the practical performance. On the other hand there is considerable delay in the outcomes of the written non-mastery test.

Third,in the modified mastery learning format there is continuous and immediate feedback on each test response. One incorrect response negates all prior correct responses on the test unit. This is extremely punishing. The punishing effects on the written non-mastery evaluation are less severe because of 1) delayed feedback, 2) one incorrect answer does not impact negatively on other related correct answers, and 3) the written test occurs in a conventional test environment.

Thus, a plausible answer for disparity of study time per weighted value spent by the subjects on the two types of examination may well have been the nature of the adverse consequences of the examination.

Nature of the Study Environment

The nature of the study environment for the practical performance examination and the written non-mastery test were different. The mode of study for the written examinations, as reported, was self-directed by the subjects. On the other hand, study for the practical examination was composed of out-of-class instruciton by the instructor, and peer assistants, with a minimum of negative consequence. Thus, the inducement was strong for participation in out-of-class drill instruction.

There were two other ways in which the study environments of the practical examination and the written non-mastery test differed. One was that after the subjects had participated as peer tutors in the out-of-class instruction, they then at the request of peers established mini drill sessions independent of the instructor. Another essential difference was that the out-of-class instructional drill sessions provided incentive for students to distribute study throughout the entire six weeks of the course prior to the final practial examination. This was not the case for preparation of the written non-mastery test.

Raise the Percentage of Those Who Can Master

The results of this study suggest that with the modified mastery learning format a greater number of subjects reached mastery when compared to the written test if standards were comparable. Seventy-eight percent of the subjects mastered all of the instructional unit on the final

practical examination. However, on the written non-mastery test of comparable content, only one person achieved mastery at the one-hundred percent level. The variability of performance was greater on the non-mastery written examinations than the practical examination. These findings support those of Bloom (1976) who indicates 80% of the students may reach the same high level of attainment in which only 20% of the students would reach under more traditional approaches.

Differences Between Practical Mastery Learning and Non-Mastery Written Learning

The testing conditions on the practical mastery examination when compared to the written non-mastery tests were markedly different. The practical examinations are more difficult than the written non-mastery test. In preparation for the practical examination the subjects passed through at least three stages. First, the subjects had to understand the concepts against which performance was to be evaluated; second, the concepts had to be generalized into actions; and third, the concepts were converted into physical practice and applied under several conditions.

The conditions under which the practical examination was conducted was more stressful than the written test because there were time constraints placed on recall and performance of each examination item. This was not the case

in the written non-mastery examinations, where time was completely controlled by the subjects. The type of pupil response was also different in the practical examination in that it required physical performance to link behavior with concepts of instruction.

Declarative vs Procedural Knowledge

Training procedures may require different approaches depending upon the types of training outcomes. Declarative knowledge obviously can be learned effectively through written tests. However, procedural knowledge which must be applied in natural instructional settings may require higher levels of criterion for mastery to generalize techniques to applied settings. Furthermore, procedural knowledge may need to be expressed in an applied form that undergoes considerable repetitive practice. The findings of this study suggest that the modified mastery learning may be an effective means for training skills based on procedural knowledge. In the case of this study, modified mastery learning format facilitated the development of rather complex behaviors through intense training. It was apparently effective. On the other hand, the non-mastery approach may need less scrutiny of performance because in some cases, the behavioral changes in subjects to conduct instruction may not be directly linked with instructional information. Clinical practices designed to bring about functional changes in learners require the attainment and

retention of procedural knowledge. Declarative knowledge attained at mastery levels may be less critical to bring about positive change of learners in clinical practice.

Self Worth as a Function of Failure

The modified mastery learning system was designed to minimize the potential detrimental effects that may be present in other forms of mastery learning which may diminish self worth (Covington, 1981). There was considerable reduction of failure on the practical mastery examination. There were 152 potential student mastery units in this study (4 units x 38 subjects). The success rate was 92%. The high success rate may have been due to over-learning of the material by some students. On the other hand, excess over-learning may have been a detriment to mastery of other information. Thus, the findings of this study suggest that the modification of mastery learning format may improve opportunity for success of students and thus avoid the consequence of diminished self-worth through failure sets.

Prediction of Success on the Written and Practical Examination

The results of this study indicate that the amount of time in study for the practical examination enabled prediction of performance on practical mastery learning units but not on the written non-mastery examination.

However, these results must be interpreted cautiously because of the different types of measures of student performance that were used on each examination. The implications of these findings may suggest that when the objectives and content are clear and there is organized practice to achieve these objectives success rates increase and time spent in practice may have a positive effect on test results. Other independent variables did not predict success on the dependent measures of the written non-mastery examinations.

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AUTHOR ABSTRACT
(To Accompany Document Submitted to ERIC/IR)

AUTHOR: D.M. Auxter and L. Couzzo

TITLE: Training Teachers of the Handicapped Through A Competency Based Format To Instruct Motor Skills

ABSTRACT (up to 200 words): The purpose of this study was to explore preparation of instructors of motor skills for the handicapped through a competency based mastery learning format. Both mastery learning and non-mastery learning formats of instruction were used to train the potential teachers. A systems approach to training was employed in a performance based practical competency based format. The mastery learning format involved instructional inputs with protocols which related to practical events, student responses to materials to generalize instructional information, in-class drill with feedback to selected students. Out of class activity was on a volunteer basis. It provided additional instruction, drill on concepts, peer evaluations for competency, and peer drill of content. The results of the study indicate that the mastery learning activity produced higher achievement than non-mastery activity. More time was spent by the students per time value of credit awarded in mastery learning activity. Furthermore, there was a significant relationship between the time spent in preparation for the mastery learning component of the course and performance on the examination. The study supports the existing theory that through competency based learning a greater number of persons can attain the same high level of achievement as those who participate in non-competency learning conditions.

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